

## ABSTRACT

[0058] A process for fabricating Zener diodes that does not require the use of photomasks. An oxide layer is grown on a silicon substrate which is doped with an N-type dopant. The substrate is subsequently implanted with a P-type dopant, forming a PN junction. The substrate is then metallized for connecting the Zener diode to other circuit components. Advantageously, the substrate may be scribed after processing, before processing, or anytime during processing. Back-to-back Zener diodes formed in this manner are used as shunt circuits across individual lamp sockets in series-wired Christmas light strings to maintain current flow to each of the lamps of the light string when one or multiple lamps fail.